

A NEW SAND-DUNE-INHABITING *NOVELSIS*
(COLEOPTERA: DERMESTIDAE) FROM CALIFORNIA AND
NEVADA

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Abstract. — Adult and larval stages of *Novelsis sabulorum*, n. sp., from California and Nevada sand deserts are described. The fossorial adaptations of the species are unique among the Dermestidae.

In the course of investigating beetles inhabiting California sand dunes, Fred G. Andrews of the Insect Taxonomy Laboratory of the California Department of Food and Agriculture found a new unusual larva by sifting sand at the Algodones Dunes near Glamis, Imperial County. The adult exhibits tibial structures apparently developed for digging in sand. Fossorial adaptations are unknown in any other Nearctic dermestid species. Andrews, Hardy and Giuliani (1979) speculated that this species is a sand obligate. This seems to be confirmed by the discovery of additional specimens in Nevada, all from sandy desert areas. The adult and mature larva of the species are described herewith.

Novelsis sabulorum Beal, NEW SPECIES

Adult male. — Integument of head dark brown; integument of pronotum medium brown; integument of elytra medium brown at basal $\frac{1}{5}$ becoming light tan on apical $\frac{4}{5}$; ventral surfaces, legs and antennal club medium brown. Pubescence of head brownish black, subrecumbent. Pubescence of pronotum brownish black on disc, recumbent; pubescence on pronotal lobe, posterior margin and lateral margins pale golden white; hairs of margins projecting (although hairs of holotype somewhat unnaturally glued down by collecting fluid), long, some longer than length of front tibia. Pubescence of elytra of recumbent and suberect hairs; hairs on basal $\frac{1}{5}$ subrecumbent, brownish black with some intermingled pale hairs; hairs on apical $\frac{4}{5}$ mostly subrecumbent pale golden white with many fewer intermingled subrecumbent and suberect brownish black hairs; some black hairs arranged in poorly defined rows; hairs on lateral margins all suberect, pale golden white, long at elytral base becoming shorter toward apex. Eye rounding and not emarginate above base of antenna but with very small emargination behind base of antenna. Antenna (Fig. 2) 11-segmented, extending in repose to about middle of abdominal segment 1; flagellar shaft $\frac{2}{3}$ as long as segment 1 of club, $\frac{1}{8}$ as long as total length of club; ratio of length of terminal segment to combined length of pronotum and elytra 1:3.6. Channel in front of eye for reception of flagellar shaft

very slightly concave; anterior margin forming short, low, threadlike carina not visibly projecting from side of head when seen from front; carina terminating before base of maxilla. Pronotum with lateral carina becoming evanescent around anterolateral angle; basal lobe very little produced and broadly and slightly emarginate at apex. Scutellum narrow, slightly prominent. Ventral surfaces covered with long, pale golden white hairs. Hypomeron slightly inflated, not contiguous with hind margin of lateral lobe of prosternum so that trochantin well exposed. Prosternum with posterior margin of lateral lobe slightly reflexed; posterior process extending posteriad almost to apex of front coxae when coxae in repose; apex of process not expanded; disc without longitudinal carina, without distinct lateral carina before anterior margin and without median anterior denticle. Epipleuron indistinctly formed, scarcely apparent beyond middle of lateral margin of metasternal episternum. Ventral plate of hind coxa not forming tooth but length of plate from point of insertion of trochanter diminishing more or less gradually for entire width; plate extending behind metasternal episternum but not quite attaining metasternal epimeron. Legs covered with long, pale golden white hairs; length of longest hairs $\frac{2}{3}$ length of hindfemur. All tibiae with long outer and somewhat shorter inner apical spines; longer spine on front leg extending to apex of tarsal segment 2 (Fig. 3). Foretibia not carinate on dorsal margin. Midfemur with ventral surfaces somewhat flattened but without crural cavity.

Length (of pronotum and elytra): 3.9 mm; width (across humeri): 1.8 mm.

Adult female.—Unknown.

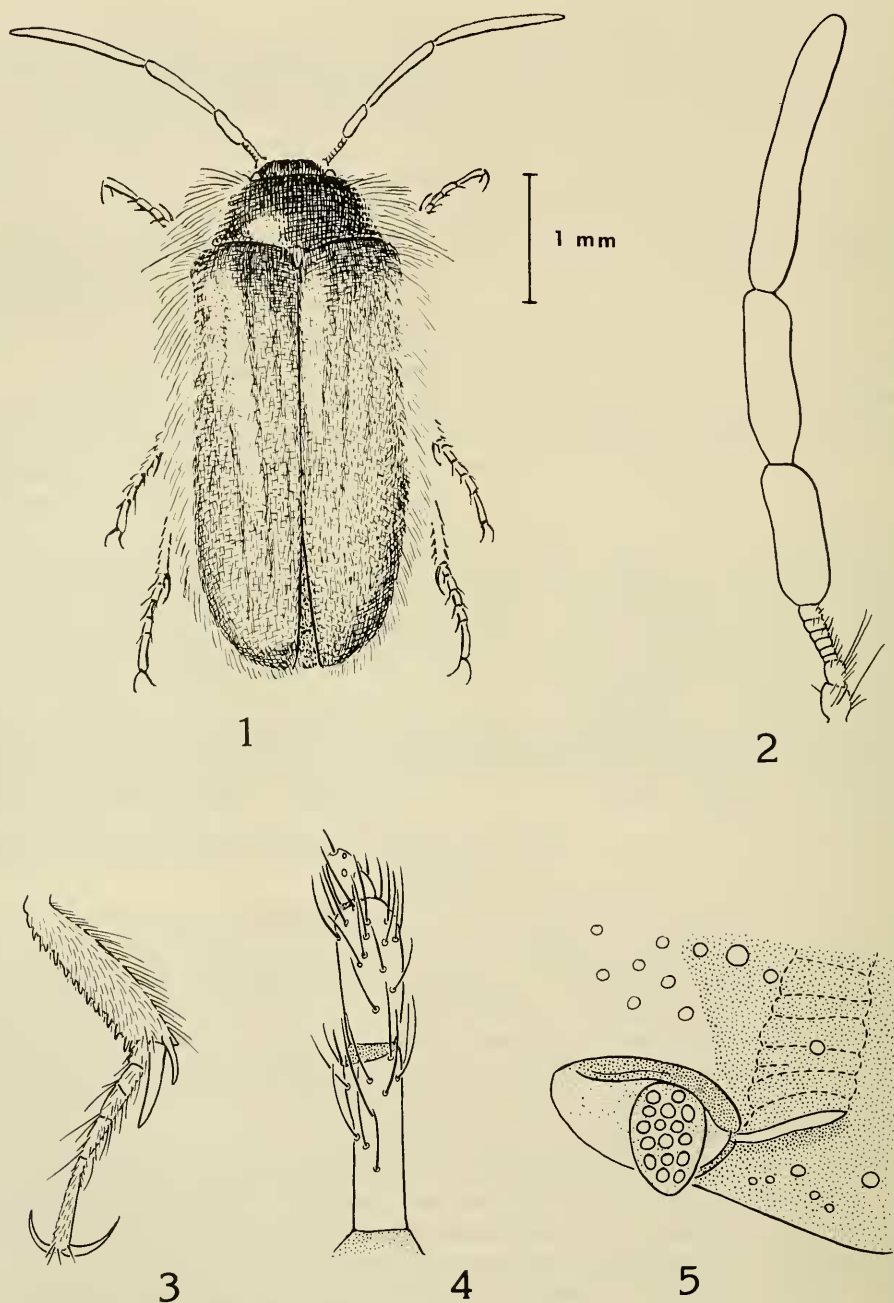
Range of observed variations.—Elytra with or without darkly colored integument at basal $\frac{1}{5}$; pubescence of all pale hairs to almost equal number of dark and pale hairs. Length varying from 3.6 to 4.5 mm. Ratio of width to length varying from 1:2.10 to 1:2.36.

Mature larva.—Integument of head and dorsal surfaces yellowish; color of setae (based on appearance of exuviae) light golden.

Head: Antenna (Fig. 4) with ratio of length of segment 3 to segment 2 1:2.3; ratio of length of segment 3 to segment 1 1:3.2; accessory papilla entirely terminal, $\frac{1}{2}$ as long as segment 3; segment 2 with numerous setae inserted from basal $\frac{1}{3}$ to apex; terminal seta about $\frac{1}{2}$ as long as length of segment 3. Epipharynx with proximal series of 17 sensory pits, middle series of 6 sensory papillae and distal series of 2 widely separated sensory pits. Maxillary palpus with 4 setae inserted on segment 3. Labium with 11 simple setae inserted on dorsal surface of each lobe of ligula; palpus without setae on basal segment.

Body setae: Margins of all setae smooth. Anterior part of terga with fine, simple setae varying in length from $\frac{1}{4}$ to subequal to length of tergum. Terga without submarginal erect setae; disc rather densely clothed with long, fine setae, some 3 times length of tergum, and with numerous linear-lanceolate setae $\frac{1}{2}$ to $\frac{2}{3}$ as long as length of sclerotized area of tergum; linear-lanceolate setae faintly and minutely longitudinally ribbed with smooth margins; posterior margin of tergum with row of numerous linear-lanceolate setae. Sterna with long, simple setae on anterior part of each segment, intermingled simple and linear-lanceolate setae on disc and dense row of linear-lanceolate setae along posterior margin.

Spiracle and associated structures: Spiracle closed behind by tergum; opening slit-like; anterior margin more or less straight; posterior margin somewhat thickened; slit connecting laterally with emargination formed in tergum for reception



Figs. 1-5. *Novelsis sabulorum*. 1, Adult male habitus. 2, Antenna of adult male. 3, Front view of left tibia and tarsus of adult male. 4, Antenna of larva. 5, Spiracle and spiracular sclerite from abdominal segment 3 of larva. Circles represent points of insertion of setae; the size of the circle is roughly proportional to the size of the seta.

of spiracular sclerite. Spiracular sclerite ovate, not enclosed by tergum; 12 to 20 setae inserted in sclerite. Area of tergum in front of spiracular sclerite forming sclerotized ridge projecting somewhat laterad of tergum so that spiracular sclerite and ridge appear partially separated from tergum (Fig. 5).

Terga and abdomen: All segments of body without antecostal suture. Abdominal tergum 9 about $\frac{3}{4}$ as long as tergum 8. Distinct sclerites not apparent in sternum of abdominal segment 9.

Legs: Femur of foreleg about 2 times as long as wide. Two pair of longer stout setae on ventral side of tibia about $\frac{2}{3}$ as long as length of pretarsal claw. Setae at base of pretarsus slender, subequal in width and length, extending to about middle of claw.

Type specimens.—Holotype ♂ and 2 ♂ paratypes, Blow Sand Mountains, T 15 N, R 20 E, Churchill County, Nevada, August 2, 1979 (R. C. Bechtel, L. M. Hanks, D. L. Horton, R. W. Rust). Additional paratypes as follows: 5 ♂, Indian Lake-sand, Churchill County, Nevada, "VIII-23/11-13 1980" (J. B. Knight); 1 ♂ with 2 larval skin casts, Glamis, Imperial County, California, as larva April, 1968, reared August, 1969 (Fred G. Andrews). Holotype and 1 paratype deposited in the California Academy of Sciences. Additional paratypes deposited in the collections of the Nevada Insect Survey, Nevada State Department of Agriculture, the National Museum of Natural History, and the author.

Etymology.—*Sabulorum* is a Latin genitive plural neuter noun meaning "of the sands."

Diagnosis.—Adults of this species are distinguished from all other known *Attagenini* by the long spine at the apex of each tibia, which on the forelegs extends to the apex of tarsal segment 2. An additional character, which separates *N. sabulorum* from other described species of *Novelsis*, is the exceptionally long setae of the body and legs, some hairs of the hind legs being $\frac{2}{3}$ the length of the femur. In *N. picta* Casey, which bears longer hairs on the legs than any other previously described species, the longest hairs are no more than $\frac{1}{5}$ the length of the hind femur.

Larvae are easily distinguished from all other described larval *Attagenini* by the lack of an antecostal suture on all thoracic and abdominal segments. In the key to known mature larvae of Nearctic *Attagenini* published by Beal (1970), this character could be run in before the first couplet to separate *N. sabulorum* before considering other species. Additionally, this species has a large number of setae inserted on antennal segment 2, a character shared among known larvae of *Attagenini* only by *Attagenus fasciatus* (Thunberg).

Comments.—The systematic position of this species needs further investigation, a need that in this author's opinion will be fully satisfied only with a world-wide generic revision of the tribe. Adults, at least superficially, seem to be close to other species of *Novelsis*. The elongated shape of the antennal club and the elongated shape of the body seem to place the species in the group that includes *N. horni* Jayne, *N. andersoni* Beal, *N. picta* Casey, and *N. timia* Beal. On the other hand, the exposed foretrochantin and lack of a tooth on the metacoxal plate associate the species with *N. athlophora* Beal and *A. bicolor* Harold. In contrast, larval characters point to a closer alignment with a group of species clustered around *Attagenus pello* (L.), the type species for *Attagenus*. In common with *A. pello*

the epipharynx possesses a distal set of 2 sensory cups, which are lacking in *N. horni*, *N. andersoni* and *N. uteana* Casey. The broad dorsal setae with smooth margins and numerous longitudinal ribs are more like those of *A. pellio* than species of *Novelsis*. Conceivably the species might be removed to a separate genus along with *A. bicolor* and *N. athlophora* or even a new monotypical genus established for it.

Andrews reared the larva he collected to maturity on a diet of dead mealworms, suggesting that the species is a scavenger on dried protein materials, as are other species of *Novelsis* for which the larval habitats are known (Beal, 1954). Beyond this, one can only speculate on the possible habitats of the larvae. It is possible they live in the nests of sand-burrowing wasps or bees.

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